MITRE

26 October 1988
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Ms Shelley Brodie
U S Environmental Protection Agency
Region VII
726 Minnesota Avenue
Kansas City Kansas 66101

Dear Ms Brodie

Enclosed are the quality assurance comments for Big River Mine Tailings Desloge Missouri

If you have any questions regarding this material please call Fred Price at (703) 883 5395 or Barry Nash at (703) 883 5843

Sincerely

for L Sue Russell
Group Leader
Hazardous Waste Systems

LSR/cjk

Enclosure

cc S Crystall
B Myers

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COMMENTS ON BIG RIVER MINE TAILINGS
Desloge Missouri
Fred T Price
October 24 1988

GENERAL DESCRIPTION OF THE FACILITY

The Big River Mine Tailings site is located in St Francois County near Desloge, Missouri The site covers approximately 500 acres and consists of mine tailings (reported to be up to 100 feet thick) The tailings pile is the result of 30 years (1929 to 1958) of stockpiling lead mining wastes from a nearby mill The tailings containing Pb Cd and Zn were transported to the site via a slurry pipeline

A sanitary landfill (approximately 60 acres) is located on the south end of the site This landfill is within the site boundaries and has been operating since 1973 with a state permit Six monitoring wells were installed around the landfill in 1987

An observed release to surface water and air have been scored and the ground water route has been evaluated In 1977 during a severe storm an estimated 50 000 cubic yards of tailings were washed into the Big River Wind erosion is a major source of air pollution at the site Tailings material is fine grained and easily suspended in the air An eight page special studies addendum has been included with the documentation

GROUND WATER ROUTE

Observed Release

If the mine tailings are as much as 100 feet thick at some site location(s) (Reference 3, page 1a) and the water table is encountered at depths of from 13 5' to 34 below the surface of the tailings pile (Reference 21) then it appears that an observed release to ground water should have been scored Furthermore, no mention is made of any analytical results from the six monitoring wells placed around the landfill in 1987 Do analytical data from the monitoring wells exist and do they support an observed release to ground water?

The statement 'No observed release cited to date suggests that an observed release might be cited in the future It is suggested that the statement be revised

Route Characteristics

The depth from the lowest point of waste disposal/storage to the highest point of the water table is not usually given a value of 0 unless an observed release to ground water has been scored

Containment

Cite References 13 and 35 to support the statement that the tailings pile is uncovered and unstable

Waste Characteristics

It appears that the area of the mine tailings should be 500 acres rather than 600 acres Reference 3 page 1a, states that the tailings pile covers 500 acres Reference 25 states that the landfill owns 502 acres and that they have a state permit to fill approximately 60 acres Why is the quantity of waste calculated using 600 acres?

The use of an average thickness for the mine tailings is not sufficiently documented The average thickness of 48 feet is based on the results from 6 monitoring wells which are apparently located around the 60 acre landfill not scattered throughout the 500 acre site

Without additional documentation it is suggested that the quantity of tailings be calculated as follows

$$60 \text{ acres} \times \frac{43,560 \text{ ft}^2}{\text{per acre}} \times 48 \text{ ft thick} = 1\ 25 \times 10^8 \text{ ft}^3 = 4\ 646\ 400 \text{ yd}^3$$

Note also that a depth of only one inch over the entire area would generate a waste quantity greater than 67 000 cubic yards so a very conservative estimate of depth based on observations and boring data could be used

Targets

The documentation for ground water use does not appear to be sufficient Reference 2 does not support the statement that "The Bonneterre aquifer and Lamotte aquifer are used for drinking water " Reference 8 does not support the statement that The second well is located in the town of ~~Elvins~~ and pumps from a mine in the Bonneterre Formation " Please cite the relevant references

The means by which the population served by ground water was determined to be 22 517 needs to be further clarified It is not clear from References 16 and 22 how the population on Rural Water (431 houses) was determined Reference 27 states that the population for Bonneterre and East Bonneterre is 4 000 not 4 320 Please explain how the numbers in the documentation were determined

SURFACE WATER ROUTE

Observed Release

It is not clear from the documentation and the references that the observed release is not the result of a regional problem in the drainage area known as the 'Old Lead Belt rather than a release caused by the tailings pile near Desloge Missouri For example it appears from Reference 9 page 5 that the distances between the background sample location and the contaminated sample locations are in the order of tens of stream miles Furthermore Reference 9 and Reference 16 (maps) indicate numerous tailings ponds both upstream and downstream from the tailings pond identified as the source of the lead in the water and sediment A background sample(s) near the observed release would help to identify the Desloge tailings pile as a source analytically significant above background

AIR ROUTE

Observed Release

The background for an observed release to air is not sufficiently documented The distance between the background sample and the facility is given as approximately eight miles Since there are numerous tailings ponds shown on the topographic map in the vicinity of the site the background sample(s) should be closer to the site The prevalent wind direction and the specific wind direction on the day of sampling are not mentioned The background sample(s) should be taken upwind of the site

Waste Characteristics

It is not clear why cadmium lead and zinc would present a moderate fire hazard " Cadmium lead and zinc are metals and are not readily combustible Please explain further or remove

Zinc and cadmium both appear in Group 2 A on Table 12 of the HRS users manual and therefore do not represent an incompatible pair of compounds for HRS purposes

General Comments

Because of the extensive revisions required for this package and the need for additional documentation at least one additional round of QA review will be necessary

Ground Water

— I recorded your ground water observed release, see what you think However I think that we should stand our ground an not score the release due to the fact that the landfill wells do not have an offsite background sample I thought that the whole reason for not scoring an observed release was because we wanted to stay away from the landfill issue Since we can not prove that the landfill is not the problem In addition, just because the tailings are located in GW does not mean there is a release this would be a ~~presence~~ function of many different variables such as pH We don't have the data. It's not like documenting a solvent or lead containing plating waste in the aquifer

— Why can't we say no observed release cited to date?

— I added a few extra references to support containment

— I dont agree with him on waste quantity. I suggest that we cite reference 5 p 29 Soil Survey which describes the piles as being from 50 to 250 feet thick

— Targets, looks good

Surface Water

I think what you have for surface water observed release is fine However you may want to discuss with Price that in addition to quantitative data (sample results) you have qualitative info documented (collapse of 50000 yd^3) I don't see how you can get any stronger ~~data~~ argument Also tell him that we don't have availability to resample

Air Route

Need map showing Bkg locations I don't see how wind speed and direction ~~have any bearing on b~~ on the day of sampling have any bearing on your background samples

This is a qualitative observed release based on sampling data of tailings & photo doc

Addressed Comments for Big River HRS 12/28/88

Ground Water

observed release - We chose not to score an observed release to ground water due to the fact that no background samples exist In addition we wanted to avoid the landfill since we cannot differentiate between landfill contaminants and tailings release We feel that just because the tailings are located in ground water does not justify a release The would be a function of many different variables such as pH and solubility We dont have this info

route characteristics see above explanation

containment done

waste characteristics - We cited an additional reference - the Soil survey which states that the piles are 50 to 250 feet high

Targets - Added reference 36 stating where Flat River obtains their drinking water Omitted reference 27

Surface Water

observed release - see new comments in text

Air Route

observed release - added map showing background sample locations
This is a qualitative release based on past and present sampling data and photo documentation. We do not feel that one particular days wind speed and direction have any bearing on the sample results

waste characteristics - changes made

Please call Bob Overfelt or Steven Vaughn for any further questions

Facility Name Big River Mine Tailings

Location Near Desloge, Missouri

EPA Region Region VII

Person(s) in charge of the facility Marvin Hudwalker, Hudwalkers & Associates Eng

C G Mattsson, St Joe Minerals

Bryant AuBuchon, Landfill Mgr

Name of Reviewer Bob Overfelt **Date** December 12, 1988

General description of the facility
(For example landfill, surface impoundment, pile, container, types of hazardous substances, location of the facility, contamination route of major concern, types of information needed for rating, agency action, etc)

The Big River Mine Tailings site is approximately 600 acres of Pb, Cd, and Zn rich mine tailings that are uncontrolled The site is bordered on three sides by the Big River and is located in St Francois County near Desloge, Missouri The tailings are sand and silt size, unconsolidated and very permeable There is also an active landfill on 60 acres of the site

Scores S_M = 57 5 (S_{gw} = 83 8 S_{sw} = 10 9 S_a = 52 3)

S_{FE} = Not evaluated

S_{DC} = Not evaluated

FIGURE 1
HRS COVER SHEET

FIT QUALITY ASSURANCE TEAM

DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

INSTRUCTIONS As briefly as possible summarize the information you used to assign the score for each factor (e g , "Waste quantity = 4,230 drums plus 800 cubic yards of sludges") The source of information should be provided for each entry and should be a bibliographic-type reference Include the location of the document

FACILITY NAME Big River Mine Tailings

LOCATION Desloge, Missouri

DATE SCORED December 12, 1988

PERSON SCORING Bob Overfelt

PRIMARY SOURCE(S) OF INFORMATION (e g , EPA region, state, FIT, etc)

Research reports prepared by the National Fisheries Research Laboratory in Columbia, MO, the University of Missouri - Rolla, the University of Missouri - Columbia
Photo documentation during site reconnaissance conducted by EPA/FIT

FACTORS NOT SCORED DUE TO INSUFFICIENT INFORMATION

Fire and Explosion
Direct Contact

COMMENTS OR QUALIFICATIONS

Ground Water Route Work Sheet						
Rating Factor	Assigned Value Circle One		Multiplier	Score	Max Score	Ref (Section)
1 Observed Release	0	45	1	0	45	3.1
If observed release is given a score of 45 proceed to line 4 If observed release is given a score of 0 proceed to line 2						
2 Route Characteristics						3.2
Depth to Aquifer of Concern	0 1 2 (3)		2	6	6	
Net Precipitation	0 1 (2) 3		1	2	3	
Permeability of the Unsaturated Zone	0 1 (3)		1	3	3	
Physical State	0 1 2 (3)		1	3	3	
Total Route Characteristics Score				14	15	
3 Containment	0 1 2 (3)		1	3	3	3.3
4 Waste Characteristics						3.4
Toxicity/Persistence	0 3 6 9 12 15 (18)		1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 (8)		1	8	8	
Total Waste Characteristics Score				26	26	
5 Targets						3.5
Ground Water Use	0 1 2 (3)		3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 30 32 (35) 40		1	35	40	
Total Targets Score				44	49	
6 If line 1 is 45 multiply 1 x 4 x 5 If line 1 is 0 multiply 2 x 3 x 4 x 5				48,048	57,330	
7 Divide line 6 by 57,330 and multiply by 100				S_{gw} =	83.8	

FIGURE 2
GROUND WATER ROUTE WORK SHEET

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max Score	Ref (Section)
1 Observed Release	0 (45)	1	45	45	4.1
If observed release is given a value of 45 proceed to line 4 If observed release is given a value of 0 proceed to line 2					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 1 2 3	1		3	
1 yr 24 hr Rainfall	0 1 2 3	1		3	
Distance to Nearest Surface Water	0 1 2 3	2		6	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score				15	
3 Containment	0 1 2 3	1		3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 (8)	1	8	8	
Total Waste Characteristics Score			26	26	
5 Targets					4.5
Surface Water Use	0 1 (2) 3	3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3	2	0	6	
Population Served/Distance to Water Intake Downstream	0 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
Total Targets Score			6	55	
6 If line 1 is 45 multiply 1 x 4 x 5 If line 1 is 0 multiply 2 x 3 x 4 x 5			7,020	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{SW} = 10.9			

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi plier	Score	Max Score	Ref Section)
[1] Observed Release	0 45	1	45	45	5 1
Date and Location	January 25, 1988, and May 16, 1988, Big River Mine Tailings Site				
Sampling Protocol	Tailings known to be rich in Pb, Cd, and Zn and photo documentation conducted to show release				
If line [1] is 0 the S_a = 0 Enter on line [5] If line [1] is 45 then proceed to line [2]					
[2] Waste Characteristics					5 2
Reactivity and Incompatibility	(0) 1 2 3	1	D	3	
Toxicity	0 1 2 (3)	3	9	9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 (8)	1	8	8	
	Total Waste Characteristics Score		17	20	
[3] Targets					5 3
Population Within 4-Mile Radius	0 9 12 15 18 (21) 24 27 30	1	21	30	
Distance to Sensitive Environment	0 1 2 3	2	0	6	
Land Use	0 1 2 (3)	1	3	3	
	Total Targets Score		24	39	
[4] Multiply [1] x [2] x [3]			18360	35 100	
[5] Divide line [4] by 35 100 and multiply by 100		S_a =	52 3		

FIGURE 9
AIR ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	83 8	7,022 4
Surface Water Route Score (S_{sw})	10 9	118 8
Air Route Score (S_a)	52 3	2,735 3
$S_{gw}^2 + S_{sw}^2 + S_a^2$		9,876 5
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		99 4
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		57 5

FIGURE 10
WORKSHEET FOR COMPUTING S_M

GROUND WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected (5 maximum)

No observed release cited

Rationale for attributing the contaminants to the facility

Score = 0

* * *

2 ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifer(s) of concern (Ref 1, Ref 2, Ref 32)

There are two aquifers underlying a 0-100' (Ref 21, 24) layer of mine tailings In descending order are the Bonneterre and the Lamotte Formations The Bonneterre is a light-gray to dark-brown dolomite that is fine to medium grained, glauconitic in places It contains thin discontinuous shale beds and contains significant lead deposits in the form of galena (PbS) The Lamotte is a sandstone conglomerate, quartzose, arkosic, and contains interbedded red-brown shale The tailings rest directly on the Bonneterre Formation (Ref 21) No aquitards exist between the two formations of concern

Depth(s) from the ground surface to the highest seasonal level of the saturated zone [water table(s)] of the aquifer of concern

The water table was encountered at depths ranging from 13 5' to 34' below the surface of the tailings pile These water levels lie within the tailings (Ref 21) Therefore, the minimal distance of 0 feet is assigned

Score = 6

Depth from the ground surface to the lowest point of waste disposal/ storage

The tailings pile ranges from 0-100 in thickness (Ref 3, Page 1a) The water table lies in the tailings (Ref 21) Therefore, the lowest point of waste disposal from the ground surface is 0 feet

Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal)

Mean annual precipitation is 42 86 inches (Ref 4, Page 48)

Mean annual lake or seasonal evaporation (list months for seasonal)

Mean annual lake evaporation is 37 inches (Ref 4, Page 63)

Net precipitation (subtract the above figures)

42 86 - 37 = 5 86 inches

Score = 2

Permeability of Unsaturated Zone

Soil type in unsaturated zone

The soils are formed in crushed dolomitic material (tailings) from lead mining The underlying material is light gray loamy fine sand, stratified by lenses of light brownish gray silt loam (about 10% mass) (Ref 5, Sheet Number 13, and Page 40)

Permeability associated with soil type

Permeability is rapid, most precipitation is absorbed into the surface Available water capacity is low (Ref 5, Page 40) Assigned value is 3 (Ref 18)

Score = 3

Physical State

Physical state of substances at time of disposal (or at present time for generated gases)

At the time of disposal the material was deposited as a tailings slurry (liquid) It is now a fine powder-type material (Ref 3, Page 1)

Score = 3

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated

The tailings pile is uncovered and unstable (Ref 3, Page 2a, Ref 13, p 2-6, 2-8, Appendix C, Ref 35) The sanitary landfill on a portion of the site, has no liner (Ref 31)

Method with highest score

Tailings pile = 3

Score = 3

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated (Ref 12, pp 28, 29, and 30, Ref 34)

	Toxicity	Persistence	
Lead (Pb)	3	3	(Ref 7, Page 1688-1689, Ref 18)
Zinc (Zn)	---	3	(Ref 7, Page 2751, Ref 18)
Cadmium (Cd)	3	3	(Ref 7, Page 610, Ref 18)

Compound with highest score

Lead and cadmium (Ref 7)

Score = 18

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum)

This is a massive pile of mine tailings that covers more than 600 acres and is from 0-100 feet deep (Ref 3, Page 1a, Ref 16, Ref 25) The St Francois County Soil Survey states that the tailings piles are 50 to 250 feet high (Ref 5, p 27)

Basis of estimating and/or computing waste quantity
Site consists of 600 acres of mine tailings containing lead, cadmium and zinc and are 0-100 feet in thickness (Ref 3, Page 1a) On-site monitoring well logs show the average thickness of the tailings to be 48 feet (Ref 21)

$$600 \text{ acres} \times \frac{43{,}560 \text{ ft}^2}{\text{acre}} \times 48 \text{ ft thick} = 1\ 25 \times 10^9 \text{ ft}^3 \times \frac{1 \text{ yd}^3}{27 \text{ ft}^3} = 46{,}464{,}000 \text{ yd}^3$$

Score = 8

* * *

5 TARGETS

Ground Water Use

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility

The Bonneterre aquifer and Lammotte aquifer are used for drinking water (Ref 2) Two wells provide water for the Flat River Water District One well located in Desloge pumps from 410 feet in the Lammotte Formation The second well is located in River Mines and pumps from a mine in the Bonneterre Formation and Lamotte Formation (Ref 8, Ref 36) This water district provides drinking water for the towns of Desloge, Elvins, Flat River, Leadington, River Mines, and Ester (Ref 11) Rural residents obtain drinking water from wells set in the Lammotte and Bonneterre Formations (Ref 16, Ref 22, 1-8) Leadwood obtains drinking water from three wells set at 700', 790', and 827' in the Lammotte Formation (Ref 16, 23, and 28) The city of Bonneterre draws drinking water from the Lamotte Formation at depths of 720' and 746' (Ref 16 and 27)

Score = 9

Distance to Nearest Well

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply

The municipal well in Desloge is located between Locust and Poplar Streets The well is part of the Flat River Water District (Ref 8, Ref 11, and Ref 30)

Distance to above well or building

3,200' (Ref 16)

Population Served by Ground Water Wells Within a 3-Mile Radius

Identified water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each

Flat River Water District (Leadington, River Mines, Ester, Flat River, Elvins, Desloge	12,000	(Ref 8, 11, 16, and 30) Ref 36)
Leadwood (1,340), Gumbo (37 houses x 3 8 = 141)	1,481	(Ref 15, 16, and 23)
Bonneterre and East Bonneterre	4,320	(Ref 15, 16, and 30)
Terre DuLac (810 hookups x 3 8 = 3,708)	3,078	(Ref 16 and 28)
Rural Water (431 houses x 3 8 = 1,638)	1,638	(Ref 16 and 22)
TOTAL	22,517	

Rural water house count was determined from a house count from topographic maps (Ref 16)

Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1 5 people per acre)

It is known that a very limited portion of the county is irrigated, less than 99 acres in the entire county (Ref 26) Since the exact number of acres can not be determined and the number will not effect the score this category will be assigned a zero

Total population served by ground water within a 3-mile radius

According to U S Census data, topographic maps, and public water supply districts in the area

22,517

Score = 35

SURFACE WATER ROUTE

1 OBSERVED RELEASE (Ref 3, pp 1, 1a, Ref 9, pp 1, 20, 21, 28, 29, 67-70, 110, 117, 130, 134, Ref 13, pp 4-2, 4-3, 4-4)

Contaminants detected in surface water at the facility or downhill from it (5 maximum)

Lead (Pb) has been detected at slightly elevated levels at the site and four miles down river Also the sediments on the bottom of the river have been changed drastically in a physical and chemical manner Collapse of mine tailings (approx 50,000 yd^3) into Big River has been documented (Ref 13, p 2-4) Elevated levels of lead have been detected in fish downgradient of the site

	Water Samples (Dissolved Pb)	Sediment Samples (Pb)
Irondale (Bkg)	0 005 mg/l	49 6 ug/g
Desloge	0 012 mg/l	2,215 0 ug/g
Wash State Park	0 021 mg/l	1,843 4 ug/g
Browns Ford	0 026 mg/l	1,438 3 ug/g

Rationale for attributing the contaminants to the facility

Tests of the Big River bottom sediment have proven that a major release (approximately 50,000 yd^3) of Pb, Zn, and Cd rich tailings into the river in 1977 have elevated the contents of Pb in both the surface water and bottom sediment above background levels Cd and Zn are also elevated in the bottom sediment (Ref 3, pp 1, 1a, Ref 9) During the reconnaissance it was apparent that some areas of the tailings pile were in direct contact with Big River (Ref 13, pg 2-9, Appendix C, photos C-1, C-2, C-12, C-13)

Score = 45

* * *

2 ROUTE CHARACTERISTICS NA

Facility Slope and Intervening Terrain

Average slope of facility in percent

Name/description of nearest downslope surface water

Average slope of terrain between facility and above-cited surface water body in percent

Is the facility located either totally or partially in surface water?

Is the facility completely surrounded by areas of higher elevation?

1-Year 24-Hour Rainfall in Inches

Distance to Nearest Downslope Surface Water

Physical State of Waste

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated

Method with highest score

4 WASTE CHARACTERISTICS

Toxicity and Persistence

See Ground Water Route

Score = 18

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum)

See Ground Water Route

Basis of estimating and/or computing waste quantity

See Ground Water Route

Score = 8

* * *

5 TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance

Recreational uses include fishing, boating, and swimming Other uses include livestock watering and wildlife watering (Ref 10) It is also known that the bottom feeding fish at the Desloge site and for miles downstream have elevated levels of Pb in their edible tissue Samples consistently exceed the World Health Organization (WHO) dietary limit of 0 3 ug/g (Ref 9, Pages 1 and 110)

Score = 6

Is there tidal influence?

No

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less

None (Ref 16)

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less

None known (Ref 16 and 17)

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less

None (Ref 16 and 17)

Score = 0

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake

There are no intakes within 3 stream miles of site (Ref 10)

Score = 0

Computation of land area irrigated by above-cited intake(s) and conversion to population (1 5 people per acre)

There are no intakes within 3 stream miles of the site (Ref 10)

Score = 0

Total population served

0

Score = 0

Name/description of nearest of above water bodies

The Big River is the nearest perennial water body It borders the site on the west, north, and east sides (Ref 16)

Distance to above-cited intakes, measured in stream miles

The nearest intake is greater than 3 miles downstream from the site (Ref 10)

1 OBSERVED RELEASE

Contaminants detected

The mine tailings at the Desloge tailings pile have been sampled and are known to be rich in Pb, Cd, and Zn Mean concentrations were Pb 2,077 ug/g, Cd 26 ug/g, and Zn 1,226 ug/g A control soil sample was taken for the same study which contained much less Pb than the tailings The control sample was taken 1 mile north of Farmington, Missouri approximately 8 miles from the site (Ref 12, Pages 28-30, 55, 73-75)

Date and location of detection of contaminants

During a reconnaissance of the site on January 25, 1988, photo documentation was conducted It is evident from the photographs taken and from observations that a significant amount of tailings were airborne and that a plume existed for at least 1 mile to the southeast of the site (Ref 13, Appendix C) May 1988 sampling of the mine tailings has confirmed the presence of Pb, Cd, and Zn at concentrations ranging from 880 mg/kg to 1,400 mg/kg of Pb, 8 4 mg/kg to 19 mg/kg of cadmium, and 370 mg/kg to 1,100 mg/kg of zinc (Ref 33, 34, 35, and 37) Three background samples were also taken in May 1988 These samples were taken approximately 2 5 to 3 miles northwest of the site Background concentrations range from 410 mg/kg to 570 ng/kg Pb, 97 p mg/kg to 99 0 mg/kg Zn, no cadium was detected This confirms the presence of these contaminants in the airborne plume

Methods used to detect the contaminants

Tailings samples were taken prior to and subsequent to the photo-documentation of an airborne plume

Rationale for attributing the contaminants to the site

It has been determined by laboratory analyses that the tailings on-site contain substantial amounts of Pb, Cd, and Zn It has also been determined by photo documentation that these tailings become easily air borne (Ref 12, Page 29 and 30, Ref 13, Appendix C, Ref 33, Ref 34, Ref 35)

Score = 45

* * *

2 WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound

No reactive compounds exist at site

Score = 0

Most incompatible pair of compounds

No incompatible compounds exist on site

Score = 0

Toxicity

Most toxic compound

Lead (Ref 7, Page 1,688, 1,699)

Score = 9

Hazardous Waste Quantity

Total quantity of hazardous waste

Same as Ground Water Route and Surface Water Route

Score = 8

Basis of estimating and/or computing waste quantity

Same as Ground Water Route

* * *

3 TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined

0 to 4 mi 0 to 1 mi 0 to 1/2 mi 0 to 1/4 mi

Towns within a 4 mile radius of the site include Desloge - 3,844, Flat River - 4,521, Elvins - 1,440, Bonneterre - 4,320, Leadwood - 1,340, Rural House Count Population (1,014 x 3 8) - 3,853, Total population - 19,318 (Ref 14, 15 and 16)

Score = 21

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less

Not applicable (Ref 16)

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less

None known (Ref 16)

Distance to critical habitat of an endangered species, if 1 mile or less

None (Ref 17)

Score = 0

Land Use

Distance to commercial/industrial area, if 1 mile or less

The site is approximately one-half mile from the business district of Desloge, Missouri (Ref 16)

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less

> 2 miles (Ref 16)

Distance to residential area, if 2 miles or less

The site is within 1/4 mile of a residential area (Ref 16)

Score = 3

Distance to agricultural land in production within past 5 years, if 1 mile or less

Prime farmland exists within 1/4 mile of the site (Ref 5, page 45 - Sheet 13)

Distance to prime agricultural land in production within past 5 years, if 2 miles or less (Ref 5, page 45)

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

No
(Ref 20)

FIRE AND EXPLOSION
NOT SCORED

1 CONTAINMENT

Hazardous substances present

Type of containment, if applicable

* * *

2 WASTE CHARACTERISTICS

Direct Evidence

Type of instrument and measurements

Ignitability

Compound used

Reactivity

Most reactive compound

Incompatibility

Most incompatible pair of compounds

* * *

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility

Basis of estimating and/or computing waste quantity

* * *

3 TARGETS

Distance to Nearest Population

Distance to Nearest Building

Distance to Sensitive Environment

Distance to wetlands

Distance to critical habitat

Land Use

Distance to commercial/industrial area, if 1 mile or less

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less

Distance to residential area, if 2 miles or less

Distance to agricultural land in production within past 5 years, if 1 mile or less

Distance to prime agricultural land in production within past 5 years, if 2 miles or less

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

Population Within 2-Mile Radius

Buildings Within 2-Mile Radius

DIRECT CONTACT
NOT SCORED

1 OBSERVED INCIDENT

Date, location, and pertinent details of incident

* * *

2 ACCESSIBILITY

Describe type of barrier(s)

3 CONTAINMENT

Type of containment, if applicable

* * *

4 WASTE CHARACTERISTICS

Toxicity

Compounds evaluated

Compound with highest score

* * *

5 TARGETS

Population within one-mile radius

Distance to critical habitat (of endangered species)

HRS DOCUMENT LOG SHEET SITE NAME Big River Mine Tailing
CITY Desloge STATE Missouri
IDENTIFICATION NUMBER

REFERENCE NUMBER	DESCRIPTION OF REFERENCE
1	The Stratigraphic Succession in Missouri, Division of Geological Survey and Water Resources, Wallace B Howe, September 1961
2	Miller, Don, March 1, 1988, Personal Communication, Missouri Geologic Survey, Geologist, with Bob Overfelt, E & E/FIT
3	Emergency Action Plan for Lead Mine Tailings, Desloge, Missouri, 1981 MDNR
4	Climatic Atlas of the United States, 1979, U S Department of Commerce
5	Soil Survey of St Francois County, Missouri, August 1981, United States Department of Agriculture Soil Conservation Service
6	Not Used
7	Sax, N Irving, 1984 Dangerous Properties of Industrial Materials 6th Ed
8	Johnson, Dennis, March 1, 1988, Personal Communication Asst Manager Flat River Water District, with Bob Overfelt, E & E/FIT

HRS DOCUMENT LOG SHEET SITE NAME Big River Mine Tailing
CITY Desloge STATE Missouri
IDENTIFICATION NUMBER

REFERENCE NUMBER	DESCRIPTION OF REFERENCE
9	Schmitt, Christopher J , Finger, Susan E , September 1982
	The Dynamics of Metals From Past and Present Mining
	Activities in the Big and Black River Watersheds,
	Southeastern Missouri, U S Fish and Wildlife Service
	Columbia National Fisheries Research Laboratory
10	Howland, John, March 1, 1988, Personal Communication
	MDNR, with Bob Overfelt, E & E/FIT
11	Johnson, Dennis, December 2, 1987, Personal Communication
	Asst Manager Flat River Water District, with Bob
	Overfelt, E & E/FIT
12	Wixson, B , et al , A Study on the Possible Use of Chat
	and Tailings from the Old Lead Belt of Missouri for
	Agricultural Limestone, University of Missouri - Rolla
	December 1983
13	Preliminary Assessment of the Big River Mine Tailings
	Site, E & E/FIT, TDD#F-07-8711-039, PAN #FM00616PA
	March 1988 (Photographs Appendix C)
14	U S Census Bureau, December 2, 1987, Personal
	Communication, 1100 hours, Bob Overfelt, E & E/FIT
15	U S Census Bureau, December 2, 1987, Personal
	Communication, 1515 hours, Bob Overfelt, E & E/FIT

HRS DOCUMENT LOG SHEET SITE NAME Big River Mine Tailing
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IDENTIFICATION NUMBER

REFERENCE NUMBER	DESCRIPTION OF REFERENCE
16	Mineral Point, MO (1958), Bonneterre, MO (1958), French Village, MO (1964), Irondale, MO (1958), Flat River, MO (1982), and Farmington, MO (1982), 7 5 Minute Series Quadrangles, U S G S Topographic Maps
17	Dickneite, Dan, March 18, 1988, Personal Communication, Missouri Department of Conservation, to Bob Overfelt, E & E/FIT
18	Uncontrolled Hazardous Waste Site Ranking System, A Users Manual, July 16, 1982
19	Not Used
20	King, Carol, March 24, 1988, Personal Communication, Flat River Chamber of Commerce, Bob Overfelt, E & E/FIT
21	Drilling Logs for landfill Monitoring Wells, Hudwalker & Associates, Inc
22	Rural Well Logs, State of Missouri Division of Geological Survey and Water Resources
23	Leadwood Municipal Well Logs, State of Missouri, Division of Geological Survey and Water Resources
24	Exploration Well Logs, Missouri Bureau of Geology and Mines, Rolla, MO

HRS DOCUMENT LOG SHEET SITE NAME Big River Mine Tailing
CITY Desloge STATE Missouri
IDENTIFICATION NUMBER

REFERENCE NUMBER	DESCRIPTION OF REFERENCE
25	Hudwalker, Marvin, Hudwalker and Associates, Personnel Communication, February 2, 1988, Bob Overfelt, E&E/FIT
26	Mineral and Water Resources of Missouri, Volume XLIII, Second Series, 1967, Geological Survey and Water Resources
27	Degonia Danny, Bonneterre Water District, May 12, 1988, Personal Communication, Bob Overfelt, E & E/FIT
28	Joyce Tilley, Terre DuLac Utility Company, May 12, 1988, Personal Communication with Bob Overfelt, E & E/FIT
29	Hedgcorth Tamera, City Hall Leadwood, May 11, 1988, Personal Communication, Bob Overfelt, E & E/FIT
30	Flat River and Bonneterre Water Departments, Flat River and Bonneterre Water Service Boundaries
31	Telephone Conversation Record, Steven Vaughn, E & E/FIT, to Mike Phillips, Waste Management Division, MDNR, Subject St Francois County Landfill, May 19, 1988
32	Schematic Cross Section of the Big River Mine Tailings Pile and Underlying Bedrock, E & E/FIT, May 19, 1988
33	Big River Mine Tailings Desloge, Missouri, Site Map, E & E/FIT, April 1988
34	Data Transmittal for Activity #TK981, Big River Mine Tailings, 5/20/88

HRS DOCUMENT LOG SHEET SITE NAME Big River Mine Tailing
CITY Desloge STATE Missouri
IDENTIFICATION NUMBER

REFERENCE NUMBER	DESCRIPTION OF REFERENCE
35	On-site Photographs, Big River Mine Tailings Site, E & E/FIT, May 1988
36	Telephone Conversation Record, Bob Overfelt, E & E/FIT, with Ron Warren, Flat River Water and Sewer District
37	Big River Mine Tailings Desloge, Missouri, Background Sample Location Map, E & E/FIT, July 1988

TELEPHONE CONVERSATION RECORD

DATE OF CALL November 21, 1988 **TIME OF CALL** 0945

PERSON CONTACTED Ron Warren, Superintendent

COMPANY Flat River Water and Sewer District **TITLE**

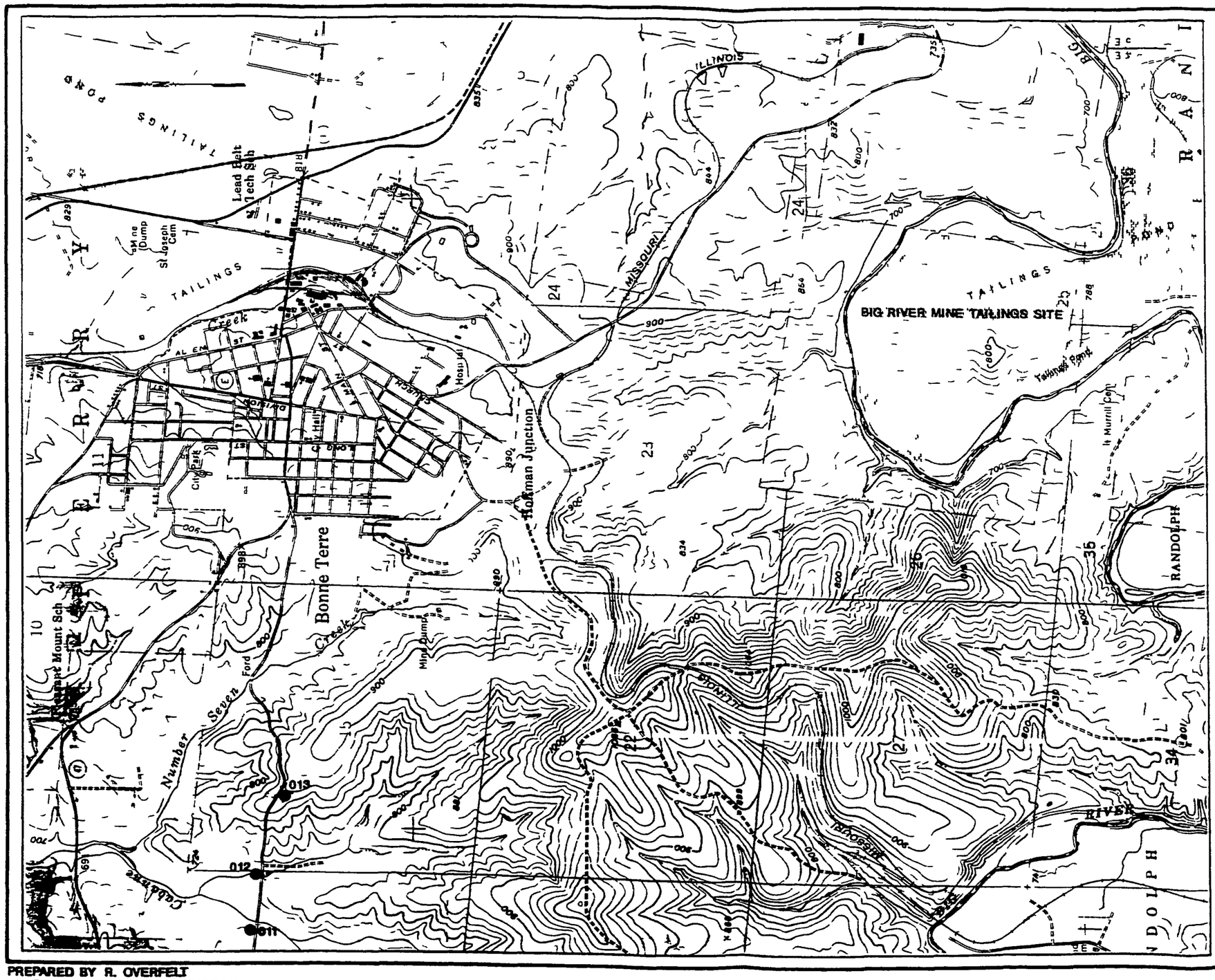
SUBJECT OF CALL [illegible] **TELEPHONE #** [illegible]

CONVERSATION Mr. Ron Warren stated the Flat River Water District utilizes a sealed mine shaft [illegible] at 36 St Joe Street in River mines. [illegible] public [illegible] The shaft is 422 feet deep and taps [illegible] in the [illegible] the [illegible] The quality of the [illegible] will [illegible] It [illegible] 40 feet [illegible] within 45 feet of the surface

SIGNATURE Robert C [illegible]

DATE November 21, 1988

page of



EXPLANATION

● SAMPLE LOCATION

SAMPLING CONDUCTED ON MAY 17 1988

SAMPLE SERIES TK981

BIG RIVER MINE TAILINGS

DESLOGE, MISSOURI

SCALE 1 24000

0 5 1 MILE

0 5 1 KILOMETER

ecology and environment inc
OVERLAND PARK KANSAS

PREPARED BY R. OVERFELT
WASTE SITE TRACKING NO MO0616

FIT JULY 1988
SOURCE. USGS 7 5 BONNE TERRE, MO QUAD 1958

FIGURE 3: BACKGROUND SAMPLE LOCATIONS